Report

1) Program starts upon typing: python PrefAgent.py
   This will ask for the attribute file in either directory ExampleTestCase/ or CustomTestCase/

```
C:¥Users¥ffuup¥Documents¥UNF¥yufei¥AI¥project3¥PrefAgent¥src>python PrefAgent.py
Welcome to PrefAgent!

Which directory?
[1]ExampleTestCase/
[2]CustomTestCase/
Enter number and enter:
```

2) Selecting the directory will allow you to input the attributes and constraints file

```
C:¥Users¥ffuup¥Documents¥UNF¥yufei¥AI¥project3¥PrefAgent¥src>python PrefAgent.py
Welcome to PrefAgent!

Which directory?
[1]ExampleTestCase/
[2]CustomTestCase/
Enter number and enter: 2
Enter Attribute File Name:
```

*note incorrect file names kick you out

*note MAKE SURE YOU ARE IN THE SRC FOLDER. For example, VSC may have a different working directory which will break it.

```
C:¥Users¥ffuup¥Documents¥UNF¥yufei¥AI¥project3¥PrefAgent¥src>python PrefAgent.py
Welcome to PrefAgent!

Which directory?
[1]ExampleTestCase/
[2]CustomTestCase/
Enter number and enter: 2
Enter Attribute File Name: attributes.txt
Enter Constraint File Name: 1
File path error, try again.
```

3) Successful entry will lead you to a menu of options:

```
C:¥Users¥ffuup¥Documents¥UNF¥yufei¥AI¥project3¥PrefAgent¥src
Which directory?
[1]ExampleTestCase/
[2]CustomTestCase/
Enter number and enter: 2
Enter Attribute File Name: attributes.txt
Enter Constraint File Name: constraints.txt
Choose the preference logic to use:
1. Penalty Logic
2. Qualitative Choice Logic
3. Exit
```

4) Let us try Penalty Logic first

```
You have picked Penalty Logic
Enter Preferences File Name: penaltylogic.txt
Choose the reasoning task to perform:
1. Encoding
2. Feasibility Checking
3. Show the Table
4. Exemplification
5. Omni-optimization
6. Back to previous menu
Choose the reasoning task to perform:
```

5) We select 1 to show all possible encodings and we get A LOT

```
o244 - pho, water, dumpling, ketchup, dynamite, yellow, long-grain, wonton
o245 - pho, water, dumpling, ketchup, dynamite, yellow, long-grain, egg-drop
o246 - pho, water, dumpling, ketchup, dynamite, yellow, short-grain, wonton
o247 - pho, water, dumpling, ketchup, dynamite, yellow, short-grain, egg-drop
o248 - pho, water, dumpling, ketchup, volcano, panang, long-grain, wonton
o249 - pho, water, dumpling, ketchup, volcano, panang, long-grain, egg-drop
o250 - pho, water, dumpling, ketchup, volcano, panang, short-grain, wonton
o251 - pho, water, dumpling, ketchup, volcano, panang, short-grain, egg-drop
o252 - pho, water, dumpling, ketchup, volcano, yellow, long-grain, wonton
o253 - pho, water, dumpling, ketchup, volcano, yellow, long-grain, egg-drop
o254 - pho, water, dumpling, ketchup, volcano, yellow, short-grain, wonton
o255 - pho, water, dumpling, ketchup, volcano, yellow, short-grain, egg-drop

Choose the reasoning task to perform:
1. Encoding
2. Feasibility Checking
3. Show the Table
4. Exemplification
5. Omni-optimization
6. Back to previous menu
Choose the reasoning task to perform:
```

6) Pressing the 2nd option allows us to see all the feasible objects based on the constraints.

```
Choose the reasoning task to perform:
1. Encoding
2. Feasibility Checking
3. Show the Table
4. Exemplification
5. Omni-optimization
6. Back to previous menu
Choose the reasoning task to perform: 2
There are 48 feaisble objects
```

7) We can then show the penalty table for all of these objects through option 3.

encoding	ketchup AND water	mustard AND wonton	pho OR volcano	long-grain OR boba	total penalty
o5	10	10	6	0	26
o13	10	10	0	0	20
o15	10	10	0	0	20
o20	10	10	0	0	20
o21	10	10	0	0	20
o28	10	10	0	0	20
o29	0	10	0	5	15
o30	0	10	0	0	10
o31	0	10	6	0	16
o33	0	10	6	0	16
o37	10	10	6	0	26
o41	10	10	0	0	20
o43	10	10	0	0	20
o45	10	10	0	0	20
o47	10	10	0	0	20
o48	10	10	0	0	20
o49	10	10	0	0	20
o52	10	10	6	0	26
o53	10	10	0	0	20
o56	10	10	0	0	20
o57	10	10	0	0	20
o58	10	10	0	0	20
o59	10	10	6	0	26
o60	10	10	0	0	20
o61	10	10	0	0	20
o62	10	10	0	0	20
o63	10	10	6	0	26
o69	10	10	6	0	26
o77	10	10	0	5	25
o79	10	10	0	0	20
o84	10	10	6	0	26
o85	10	10	6	0	26
o92	10	10	0	0	20
o93	10	10	0	0	20
o94	10	10	0	0	20
o95	10	10	6	0	26
o133	10	10	0	0	20
o148	10	10	0	0	20
o149	10	10	0	0	20
o161	10	10	0	0	20
o165	10	10	0	0	20
o176	0	10	0	0	10
o177	10	10	0	0	20
o180	10	10	0	0	20
o181	0	10	0	5	15
o197	0	10	0	0	10
o212	10	10	6	0	26
o213	0	10	0	0	10

```
Choose the reasoning task to perform:
1. Encoding
2. Feasibility Checking
3. Show the Table
4. Exemplification
5. Omni-optimization
6. Back to previous menu
Choose the reasoning task to perform:
```

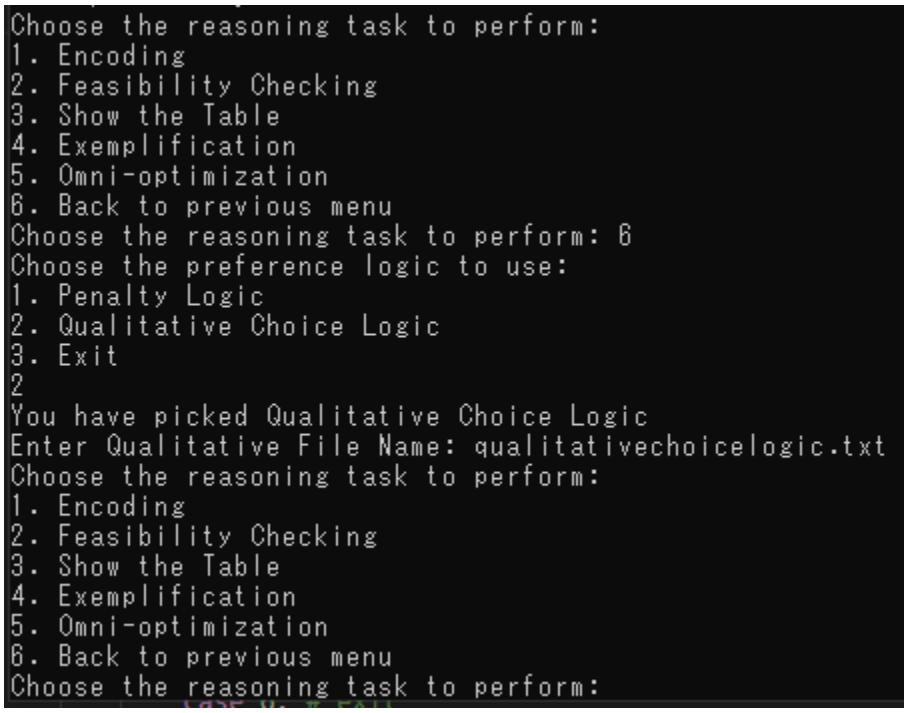
8) Option 4 randomly picks 2 and compares their preferability. We can see that 213 is less than 87 so it is more preferred.

```
Choose the reasoning task to perform: 4
Two randomly selected feasible objects are o213 and o77
o213 is strickly preferred to o77
Choose the reasoning task to perform:
1. Encoding
2. Feasibility Checking
3. Show the Table
4. Exemplification
5. Omni-optimization
6. Back to previous menu
Choose the reasoning task to perform: _
```

9) Option 5 then allows us to the most optimal one. AKA the lowest value one. We see that there are 4 items with penalty value of 10 which is the smallest

```
Choose the reasoning task to perform: 5
All optimal objects: o93 o213 o212 o92
Choose the reasoning task to perform:
1. Encoding
2. Feasibility Checking
3. Show the Table
4. Exemplification
5. Omni-optimization
6. Back to previous menu
Choose the reasoning task to perform:
```

10) Next we can return to the previous menu and select the qualitative. You will be asked to input the qualitative txt file as well.

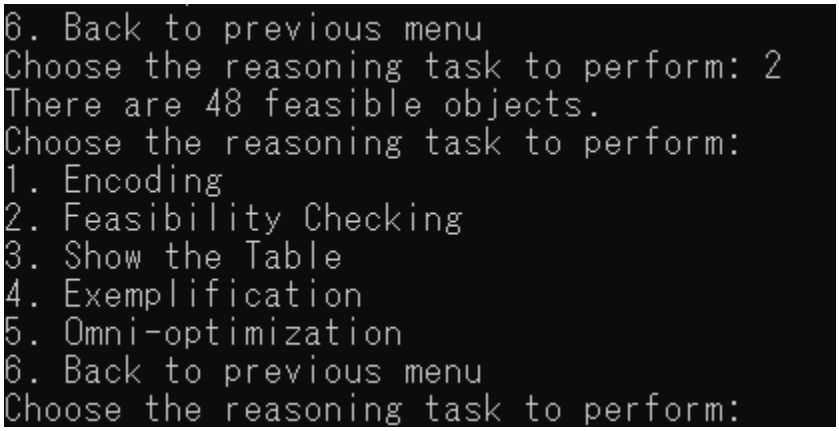


11) Once again, we can see all the possible encodings with option 1:

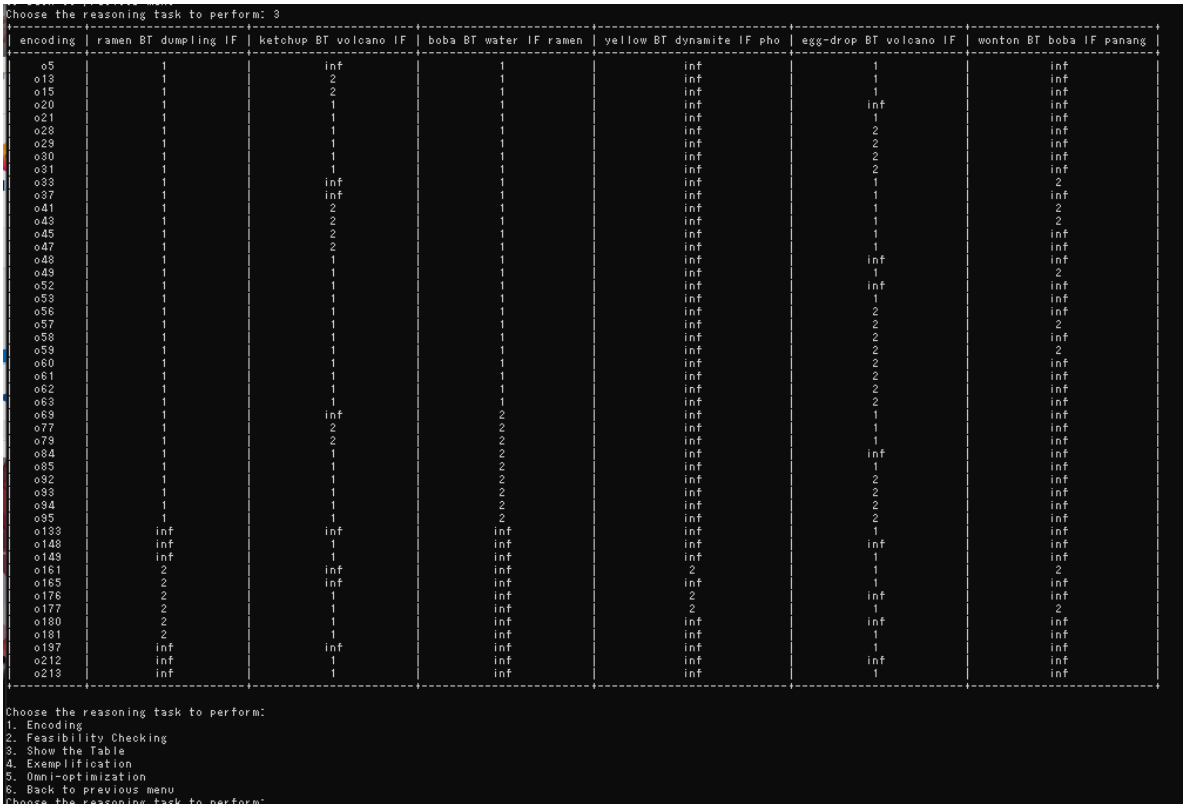
```
o224 - pho, water, dumpling, mustard, dynamite, panang, long-grain, wonton
o225 - pho, water, dumpling, mustard, dynamite, panang, long-grain, egg-drop
o226 - pho, water, dumpling, mustard, dynamite, panang, short-grain, wonton
o227 - pho, water, dumpling, mustard, dynamite, panang, short-grain, egg-drop
o228 - pho, water, dumpling, mustard, dynamite, yellow, long-grain, wonton
o229 - pho, water, dumpling, mustard, dynamite, yellow, long-grain, egg-drop
o230 - pho, water, dumpling, mustard, dynamite, yellow, short-grain, wonton
o231 - pho, water, dumpling, mustard, dynamite, yellow, short-grain, egg-drop
o232 - pho, water, dumpling, mustard, volcano, panang, long-grain, wonton
o233 - pho, water, dumpling, mustard, volcano, panang, long-grain, egg-drop
o234 - pho, water, dumpling, mustard, volcano, panang, short-grain, wonton
o235 - pho, water, dumpling, mustard, volcano, panang, short-grain, egg-drop
o236 - pho, water, dumpling, mustard, volcano, yellow, long-grain, wonton
o237 - pho, water, dumpling, mustard, volcano, yellow, long-grain, egg-drop
o238 - pho, water, dumpling, mustard, volcano, yellow, short-grain, wonton
o239 - pho, water, dumpling, mustard, volcano, yellow, short-grain, egg-drop
o240 - pho, water, dumpling, ketchup, dynamite, panang, long-grain, wonton
o241 - pho, water, dumpling, ketchup, dynamite, panang, long-grain, egg-drop
o242 - pho, water, dumpling, ketchup, dynamite, panang, short-grain, wonton
o243 - pho, water, dumpling, ketchup, dynamite, panang, short-grain, egg-drop
o244 - pho, water, dumpling, ketchup, dynamite, yellow, long-grain, wonton
o245 - pho, water, dumpling, ketchup, dynamite, yellow, long-grain, egg-drop
o246 - pho, water, dumpling, ketchup, dynamite, yellow, short-grain, wonton
o247 - pho, water, dumpling, ketchup, dynamite, yellow, short-grain, egg-drop
o248 - pho, water, dumpling, ketchup, volcano, panang, long-grain, wonton
o249 - pho, water, dumpling, ketchup, volcano, panang, long-grain, egg-drop
o250 - pho, water, dumpling, ketchup, volcano, panang, short-grain, wonton
o251 - pho, water, dumpling, ketchup, volcano, panang, short-grain, egg-drop
o252 - pho, water, dumpling, ketchup, volcano, yellow, long-grain, wonton
o253 - pho, water, dumpling, ketchup, volcano, yellow, long-grain, egg-drop
o254 - pho, water, dumpling, ketchup, volcano, yellow, short-grain, wonton
o255 - pho, water, dumpling, ketchup, volcano, yellow, short-grain, egg-drop

Choose the reasoning task to perform:
1. Encoding
2. Feasibility Checking
3. Show the Table
4. Exemplification
5. Omni-optimization
6. Back to previous menu
Choose the reasoning task to perform: _
```

12) Option 2 also, once again, shows all the feasible combinations based on the constraints



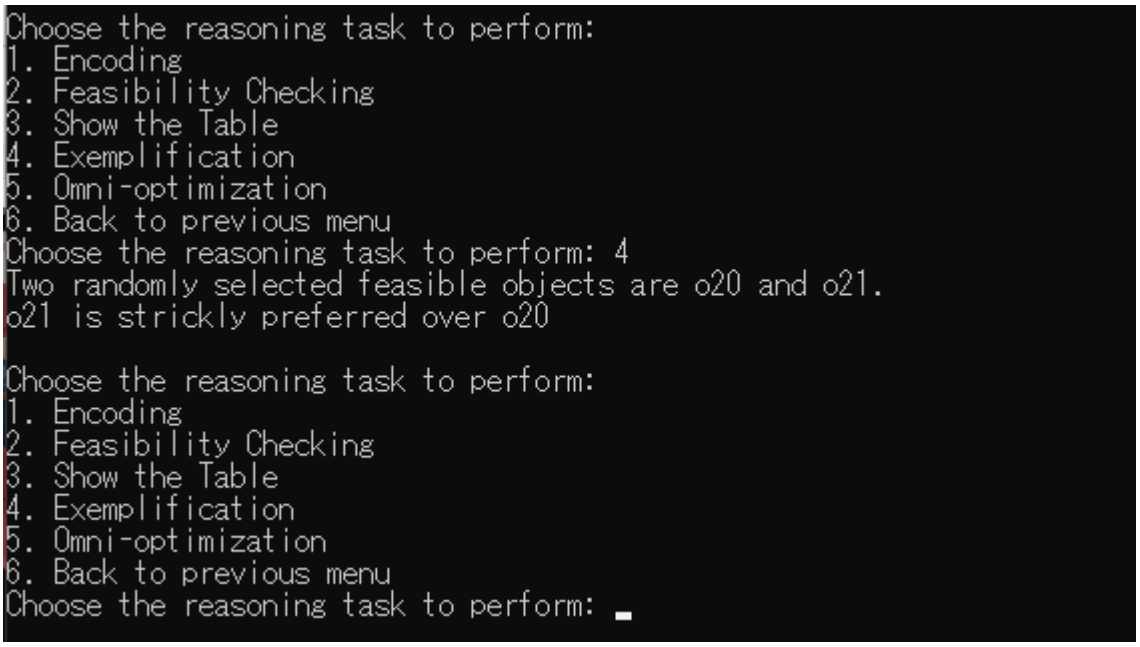
13) Option 3 shows us the table:



```
Choose the reasoning task to perform: 3
+----------+----------------------+----------------------+----------------------+--------------------------+----------------------+--------------------------+
| encoding | ramen BT dumpling IF | ketchup BT volcano IF | boba BT water IF ramen | yellow BT dynamite IF pho | egg-drop BT volcano IF | wonton BT boba IF panang |
+----------+----------------------+----------------------+----------------------+--------------------------+----------------------+--------------------------+
|    o5    |          1           |         inf          |          1           |           inf            |          1           |           inf            |
|   o13    |          1           |          2           |          1           |           inf            |          1           |           inf            |
|   o15    |          1           |          2           |          1           |           inf            |          1           |           inf            |
|   o20    |          1           |          1           |          1           |           inf            |         inf          |           inf            |
|   o21    |          1           |          1           |          1           |           inf            |          1           |           inf            |
|   o28    |          1           |          1           |          1           |           inf            |          2           |           inf            |
|   o29    |          1           |          1           |          1           |           inf            |          2           |           inf            |
|   o30    |          1           |          1           |          1           |           inf            |          2           |           inf            |
|   o31    |          1           |          1           |          1           |           inf            |          2           |           inf            |
|   o33    |          1           |         inf          |          1           |           inf            |          1           |            2             |
|   o37    |          1           |         inf          |          1           |           inf            |          1           |           inf            |
|   o41    |          1           |          2           |          1           |           inf            |          1           |            2             |
|   o43    |          1           |          2           |          1           |           inf            |          1           |            2             |
|   o45    |          1           |          2           |          1           |           inf            |          1           |           inf            |
|   o47    |          1           |          2           |          1           |           inf            |          1           |           inf            |
|   o48    |          1           |          1           |          1           |           inf            |         inf          |           inf            |
|   o49    |          1           |          1           |          1           |           inf            |          1           |            2             |
|   o52    |          1           |          1           |          1           |           inf            |         inf          |           inf            |
|   o53    |          1           |          1           |          1           |           inf            |          1           |           inf            |
|   o56    |          1           |          1           |          1           |           inf            |          2           |           inf            |
|   o57    |          1           |          1           |          1           |           inf            |          2           |            2             |
|   o58    |          1           |          1           |          1           |           inf            |          2           |           inf            |
|   o59    |          1           |          1           |          1           |           inf            |          2           |            2             |
|   o60    |          1           |          1           |          1           |           inf            |          2           |           inf            |
|   o61    |          1           |          1           |          1           |           inf            |          2           |           inf            |
|   o62    |          1           |          1           |          1           |           inf            |          2           |           inf            |
|   o63    |          1           |          1           |          1           |           inf            |          2           |           inf            |
|   o69    |          1           |         inf          |          2           |           inf            |          1           |           inf            |
|   o77    |          1           |          2           |          2           |           inf            |          1           |           inf            |
|   o79    |          1           |          2           |          2           |           inf            |          1           |           inf            |
|   o84    |          1           |          1           |          2           |           inf            |         inf          |           inf            |
|   o85    |          1           |          1           |          2           |           inf            |          1           |           inf            |
|   o92    |          1           |          1           |          2           |           inf            |          2           |           inf            |
|   o93    |          1           |          1           |          2           |           inf            |          2           |           inf            |
|   o94    |          1           |          1           |          2           |           inf            |          2           |           inf            |
|   o95    |          1           |          1           |          2           |           inf            |          2           |           inf            |
|   o133   |         inf          |         inf          |         inf          |           inf            |          1           |           inf            |
|   o148   |         inf          |          1           |         inf          |           inf            |         inf          |           inf            |
|   o149   |         inf          |          1           |         inf          |           inf            |          1           |           inf            |
|   o161   |          2           |         inf          |         inf          |            2             |          1           |            2             |
|   o165   |          2           |         inf          |         inf          |           inf            |          1           |           inf            |
|   o176   |          2           |          1           |         inf          |            2             |         inf          |           inf            |
|   o177   |          2           |          1           |         inf          |            2             |          1           |            2             |
|   o180   |          2           |          1           |         inf          |           inf            |         inf          |           inf            |
|   o181   |          2           |          1           |         inf          |           inf            |          1           |           inf            |
|   o197   |         inf          |         inf          |         inf          |           inf            |          1           |           inf            |
|   o212   |         inf          |          1           |         inf          |           inf            |         inf          |           inf            |
|   o213   |         inf          |          1           |         inf          |           inf            |          1           |           inf            |
+----------+----------------------+----------------------+----------------------+--------------------------+----------------------+--------------------------+

Choose the reasoning task to perform:
1. Encoding
2. Feasibility Checking
3. Show the Table
4. Exemplification
5. Omni-optimization
6. Back to previous menu
Choose the reasoning task to perform:
```

14) Option 4 randomly selects 2 of the objects and allows us to see their preference. We can see that object 21 is preferred over 20 because it beats out the inf with a 1



15) Lastly, Option 5 shows us all the most optimal models in the table. Of which there are 4 of them since they share the smallest equal value